**2011 Rabies Summary**
**Massachusetts Department of Public Health**

The following summarizes data collected on animal specimens from Massachusetts sent to the William A. Hinton State Laboratory Institute (HSLI) for rabies testing from January to December 2011. Cumulative reports summarizing rabies testing from 1992-2002 and annual reports from 2003 to 2010 are available on the MDPH website and can be found at www.mass.gov/dph/rabies.

## Number of Submissions and Positive Results by Year

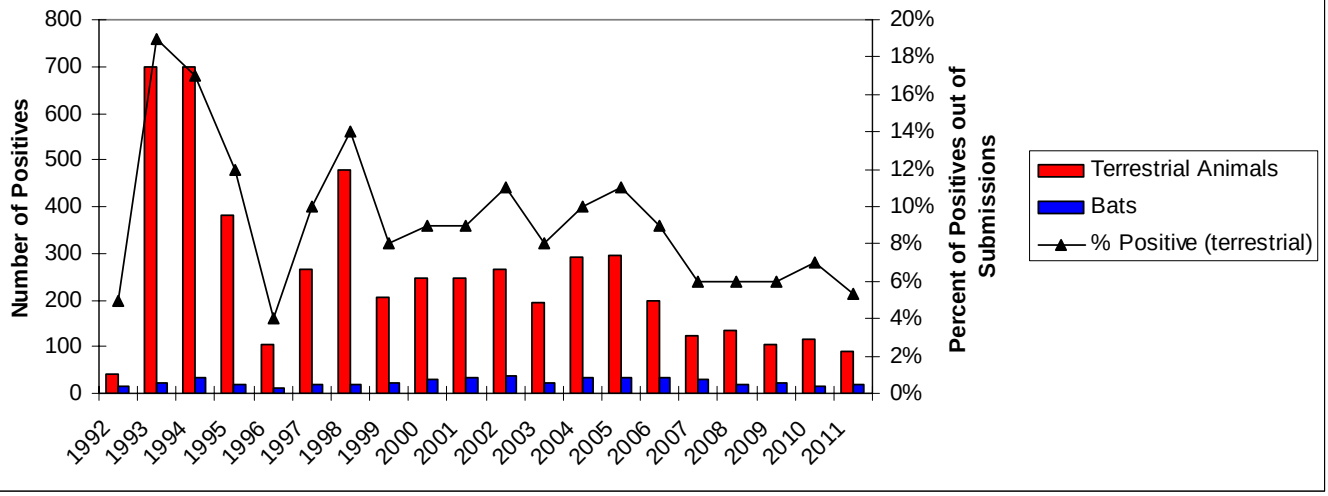
The number of terrestrial animals that tested positive in 2011 was the lowest recorded number and percent positive since 1996 (see **Table 1**). Terrestrial rabies incidence generally cycles in 4-5 year periods in Massachusetts. The 2004 introduction of raccoon rabies into the last part of the mainland, Cape Cod, interrupted the endemic cycle that had been established in the rest of the Commonwealth. This was demonstrated in 2004 and 2005 by the increased the number of rabies positive terrestrial mammals as compared to the numbers in the previous cycle, 1999-2003. (see **Figure 1**).

**TABLE 1. Number of Submissions, Positive Results and Percent Positive by Year and Type of Animal**

| | TERRESTRIAL ANIMALS | | | BATS | | |
|---|---|---|---|---|---|---|
| Year | Number Submitted | Number Positive | % Positive | Number Submitted | Number Positive | % Positive |
| 1992 | 926 | 42 | 5% | 143 | 15 | 10% |
| 1993 | 3660 | 698 | 19% | 289 | 22 | 8% |
| 1994 | 4119 | 700 | 17% | 391 | 34 | 9% |
| 1995 | 3175 | 383 | 12% | 241 | 17 | 7% |
| 1996 | 2701 | 103 | 4% | 277 | 12 | 4% |
| 1997 | 2771 | 264 | 10% | 334 | 17 | 5% |
| 1998 | 3483 | 480 | 14% | 439 | 18 | 4% |
| 1999 | 2643 | 205 | 8% | 595 | 21 | 4% |
| 2000 | 2666 | 247 | 9% | 611 | 29 | 5% |
| 2001 | 2615 | 248 | 9% | 710 | 32 | 4% |
| 2002 | 2505 | 267 | 11% | 613 | 36 | 6% |
| 2003 | 2358 | 193 | 8% | 602 | 23 | 4% |
| 2004 | 2842 | 291 | 10% | 600 | 34 | 6% |
| 2005 | 2653 | 296 | 11% | 708 | 33 | 5% |
| 2006 | 2122 | 197 | 9% | 756 | 34 | 5% |
| 2007 | 1988 | 123 | 6% | 787 | 29 | 4% |
| 2008 | 2298 | 135 | 6% | 748 | 19 | 3% |
| 2009 | 1747 | 106 | 6% | 696 | 21 | 3% |
| 2010 | 1740 | 117 | 7% | 678 | 14 | 2% |
| **2011** | **1700** | **90** | **5%** | **753** | **20** | **3%** |
| **Total** | **50,712** | **5,185** | **10%** | **10,971** | **480** | **4%** |

The number of bats submitted for rabies testing increased by 11%, despite documented population losses, primarily in little brown bats, due to white-nose syndrome. The percentage of bats that tested positive for rabies also increased slightly in 2011, from 2% to 3%.

**Figure 1: Positive Animals by Year and Type and Percentage of Terrestrial Animals Testing Positive Out of Terrestrial Animals Submitted: Massachusetts, 1992-2011**




## Notable Rabies Situations

In 2011, 2,453 specimens were submitted to the HSLI for rabies testing. Of these specimens, 110 tested positive for rabies. **Table 2** shows data on positive animals in 2011. Several notable rabies situations occurred during the fourth quarter of 2011. A sheep from Hampshire County tested positive, representing the first documented rabies positive sheep in Massachusetts. A skunk had previously been observed acting strangely during daylight hours in the vicinity of the sheep and was thought to be a potential exposure source. The day before the sheep was euthanized, the owner reported that three family members hand fed the sheep. Several other members of the community also reported hand feeding the sheep. In total, 5 people received post-exposure prophylaxis (PEP).

Two human rabies cases, both fatal, occurred in 2011. The first case was a middle-aged male from Middlesex County. Testing at the Centers for Disease Control and Prevention (CDC) confirmed a rabies virus variant found in dogs in Latin America, specifically Brazil. Investigation revealed contact with a likely rabid dog in Brazil in 2003 and no additional suspicious exposures. Based on this exposure scenario, the case had an unusually long incubation period of 8 years. The second case was the first locally-acquired human rabies case in Massachusetts since 1935. The case was a male over 60 from Barnstable County. Investigation revealed direct contact with a bat as the most likely source of exposure. Testing at the CDC confirmed a rabies virus variant most commonly associated with little brown bats.

## Number of Submissions and Positive Results by Species

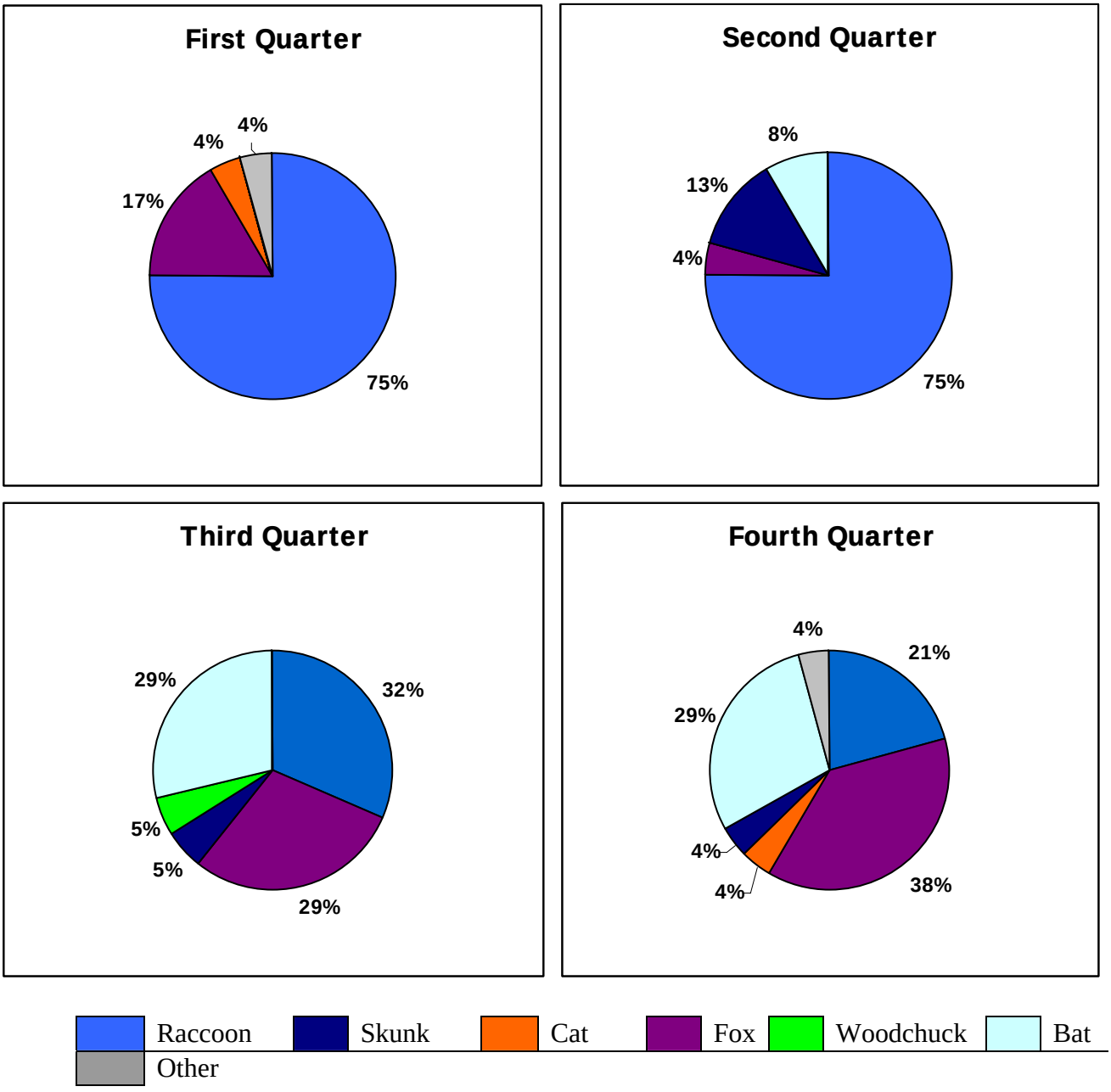
Raccoons and skunks, together, continued to account for the large majority of rabies positive animals in Massachusetts (48.2% and 30.1% respectively), although the proportion of all rabies positive animals that they represent varied by quarter. (See **Figure 2**).

**Table 2. Number of Animals Positive for Rabies/Animals Submitted (%), 2011**

| Animal | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | Total 2011 |
|---|---|---|---|---|---|
| Raccoon | 18/24 (75.0%) | 18/46 (39.1%) | 12/22 (54.5%) | 5/18 (27.8%) | **53/110** (48.2%) |
| Skunk | 4/12 (33.3%) | 1/10 (10.0%) | 11/44 (25.0%) | 9/17 (53.0%) | **25/83** (30.1%) |
| Cat | 1/174 (.6%) | 0/232 (--) | 0/280 (--) | 1/169 (.6%) | **2/855** (.2%) |
| Fox | 0/3 (--) | 3/7 (42.9%) | 2/11 (18.2%) | 1/6 (16.7%) | **6/27** (22.2%) |
| Woodchuck | 0/5 (--) | 0/19 (--%) | 2/20 (10.0%) | 0/2 (--) | **2/46** (4.3%) |
| Bat | 0/45 (--) | 2/155 (1.3%) | 11/497 (2.2%) | 7/56 (12.5%) | **20/753** (2.7%) |
| Cow | 0/0 (--) | 0/0 (--) | 0/0 (--) | 0/0 (--) | **0/0** (--) |
| Coyote | 1/1 (100.0%) | 0/0 (--) | 0/0 (--) | 0/0 (--) | **1/1 (100.0%)** |
| Dog | 0/99 (--) | 0/125 (--) | 0/121 (--) | 0/100 (--) | **0/445** (--) |
| **Other*** | 0/24 (--) | 0/33 (--) | 0/37 (--) | 1/39 2.6%) | **1/133** (.75%) |
| **TOTAL** | **24/387 (6.2%)** | **24/627 (3.8%)** | **38/1010 (3.8%)** | **24/421 (6.4%)** | **110/2453 (4.5%)** |

** QIV: Sheep*

**Figure 2. Proportion of All Positive Results Represented by Each Species, by Quarter**

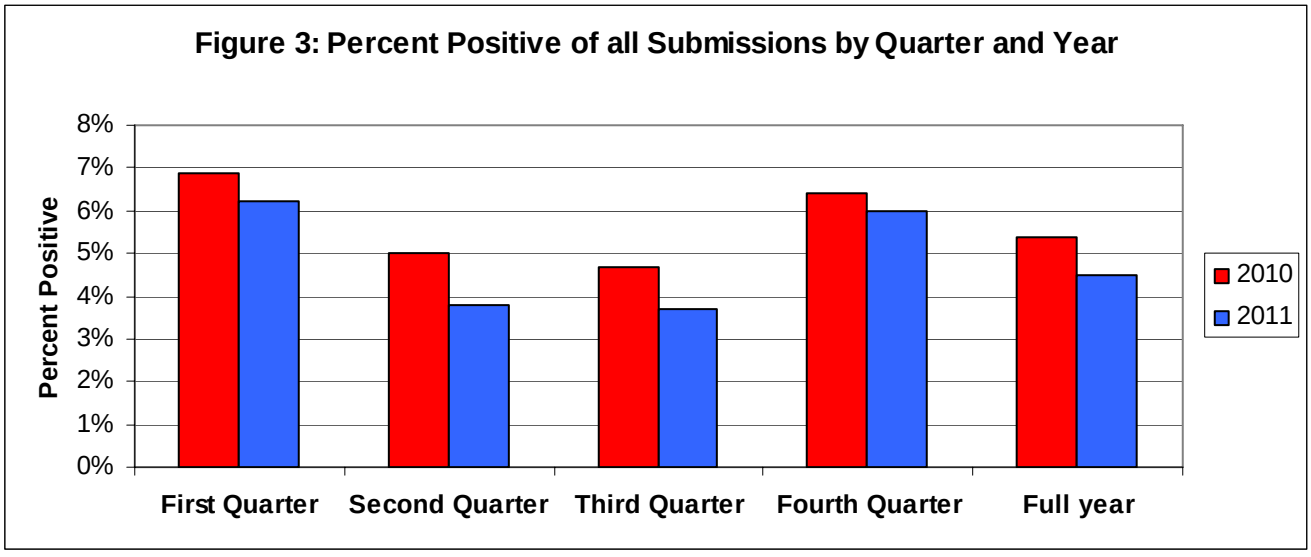



## Cumulative Submissions and Positive Results by Month

Animal submission numbers fluctuated throughout the year. As expected, the highest number of submissions occurred during June, July and August (see **Table 3**). The lowest number of submissions occurred during the winter months of December, January, and February. This same trend is seen annually and is due to the greater activity of wildlife species during the spring and summer months, coinciding with the time that humans increase their outdoor activity level. These simultaneous events result in more frequent contact between humans and wildlife, and lead to more animal rabies testing.

| Table 3. Submissions, Number Positive for Rabies, and Percent Positive by Month and Animal Type, 2010 and 2011 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TERRESTRIAL ANIMALS | | | | | | BATS | | | | | |
| **Month** | **Submitted 2010** | **Positive 2010** | | **Submitted 2011** | **Positive 2011** | | **Submitted 2010** | **Positive 2010** | | **Submitted 2011** | **Positive 2011** | |
| January | 121 | 9 | 7% | 107 | 7 | 7% | 24 | 1 | 4% | 13 | 0 | 0% |
| February | 99 | 6 | 6% | 91 | 6 | 7% | 21 | 0 | 0% | 12 | 0 | 0% |
| March | 109 | 11 | 10% | 144 | 11 | 8% | 16 | 0 | 0% | 20 | 0 | 0% |
| April | 110 | 6 | 5% | 121 | 5 | 4% | 13 | 0 | 0% | 28 | 0 | 0% |
| May | 159 | 7 | 4% | 146 | 10 | 7% | 54 | 1 | 2% | 29 | 0 | 0% |
| June | 199 | 13 | 7% | 205 | 7 | 3% | 69 | 3 | 4% | 98 | 2 | 2% |
| July | 217 | 11 | 5% | 176 | 5 | 3% | 165 | 4 | 2% | 131 | 0 | 0% |
| August | 187 | 11 | 6% | 208 | 9 | 4% | 247 | 2 | 1% | 341 | 5 | 1% |
| September | 156 | 18 | 12% | 151 | 13 | 9% | 31 | 1 | 3% | 25 | 6 | 24% |
| October | 132 | 12 | 9% | 122 | 7 | 6% | 4 | 1 | 25% | 18 | 6 | 33% |
| November | 140 | 9 | 6% | 124 | 6 | 5% | 9 | 0 | 0% | 17 | 1 | 6% |
| December | 111 | 4 | 4% | 105 | 4 | 4% | 25 | 1 | 4% | 21 | 0 | 0% |
| **TOTAL** | 1740 | 117 (7%) | | 1700 | 90 (5%) | | 678 | 14 (2%) | | 753 | 20 (3%) | |

The proportion of animals testing positive for rabies also varies throughout the year, generally showing a consistent pattern from year-to-year (see **Figure 3**). The change in the percent positive is normally small between quarters and significant departures from this seasonal pattern can be used to detect alterations in the intensity of virus circulation in an area. The percent positive was lower for all quarters in 2011 than in 2010.

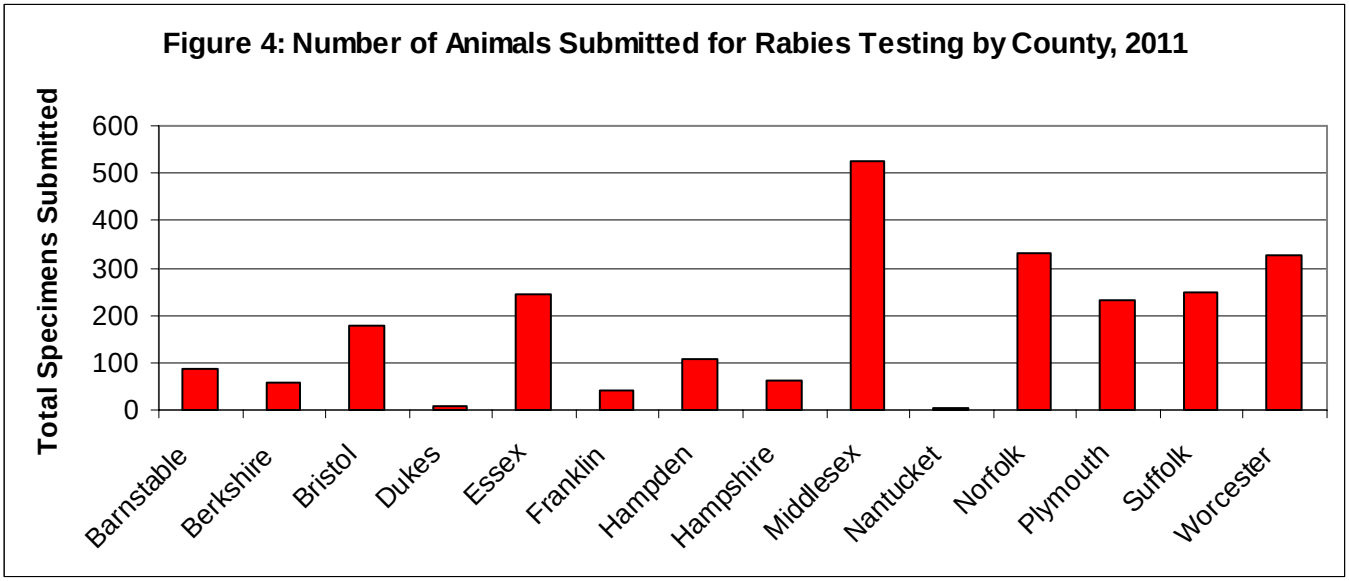


## Submissions and Positive Results by County

In 2011, each of the 14 counties in Massachusetts submitted at least one animal for rabies testing, and all counties, except Nantucket and Dukes, had at least one animal that tested positive (see **Table 4** below). Middlesex, Norfolk and Worcester counties submitted the highest number of animals (n = 526, n = 331, n = 326, respectively). Worcester County had the highest number of animals that tested positive (n = 25) and Franklin County had the highest proportion of submitted animals that tested positive (10%).

**Table 4. Rabies Testing Data by County- Number of Animals Positive for Rabies/Number of Animals Submitted (%)**

| County | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | Cumulative |
|---|---|---|---|---|---|
| Barnstable | 0/6 (--) | 0/25 (--) | 1/43 (2.3%) | 1/11 (9.1%) | 2/85 (2.4%) |
| Berkshire | 0/7 (--) | 1/22 (4.55%) | 0/22 (--) | 0/7 (--) | 1/58 (1.7%) |
| Bristol | 2/29 (6.9%) | 1/40 (2.5%) | 0/65 (--) | 2/42 (4.8%) | 5/176 (2.8%) |
| Dukes | 0/2 (--) | 0/1 (--) | 0/5 (--) | 0/1 (--) | 0/9 (--) |
| Essex | 2/45 (4.4%) | 0/60 (--%) | 4/99 (4.0%) | 2/42 (4.8%) | 8/246 (3.3%) |
| Franklin | 1/6 (16.7%) | 1/9 (11.1%) | 1/19 (5.7) | 1/6 (16.7%) | 4/40 (10%) |
| Hampden | 2/16 (12.5%) | 2/32 (6.3%) | 4/43 (9.3%) | 0/18 (--) | 8/109 (7.3%) |
| Hampshire | 0/11 (--) | 0/16 (--) | 2/29 (6.9%) | 2/7 (28.6%) | 4/63 (6.3%) |
| Middlesex | 6/90 (6.7%) | 4/139 (2.9%) | 2/212 (2.7%) | 3/85 (3.5%) | 15/526 (2.9%) |
| Nantucket | 0/0 (--) | 0/0 (--) | 0/3 (--) | 0/2 (--) | 0/5 (--) |
| Norfolk | 2/45 (4.4%) | 5/90 (5.6%) | 3/143 (2.1%) | 2/53 (3.8%) | 12/331 (3.6%) |
| Plymouth | 1/33 (3.0%) | 5/61 (8.2%) | 7/95 (7.4%) | 4/43 (9.3%) | 17/232 (7.3%) |
| Suffolk | 0/49 (--) | 0/59 (--) | 4/103 (3.9%) | 2/36 (5.6%) | 6/247 (2.4%) |
| Worcester | 8/48 (16.7%) | 5/73 (6.9%) | 7/151 (4.6%) | 5/54 (9.3%) | 25/326 (7.7%) |



**Mapping**

MDPH maps rabies-positive animals on a monthly and annual basis (see **Figure 5**). Over time, this may reveal areas of increased activity which might benefit from outreach and prevention activities.

Seven positive animals, tested for surveillance purposes from Barnstable County by the United States Department of Agriculture (USDA), are included. The USDA continues to conduct an oral rabies vaccine baiting program in multiple towns in the county in an effort to reduce the number of rabies positive animals.

**Figure 5.**